LISTING OF THE CLAIMS

The following listing of the claims replaces all prior versions and listings of claims for the application. Within this listing of the claims, claim 1 is amended.

1. **(Presently Amended)** A method of synthesizing an oligonucleotide on a solid support comprising:

~~(b)~~(a) coupling a nucleoside monomer having a protected hydroxyl group to a free hydroxyl group on a support-bound nucleoside monomer, wherein the hydroxyl group on the coupled nucleoside monomer is protected with a carbonate protecting group and the coupling reaction gives rise to a phosphite triester bond between the support-bound nucleoside monomer and the coupled nucleoside monomer; and

(b) contacting the coupled nucleoside monomer with an alpha-effect nucleophile to simultaneously (i) irreversibly remove the carbonate protecting group, and (ii) oxidize the phosphite triester linkage to a phosphotriester linkage.~~deprotecting the coupled nucleoside monomer by removing the carbonate protecting group from the coupled nucleoside monomer with an α-effect nucleophile such that carbon dioxide is produced as a by-product and the deprotection reaction is rendered irreversible, wherein the α-effect nucleophile simultaneously oxidizes the phosphite triester linkage to a phosphotriester linkage.~~

2. **(Original)** The method of claim 1, wherein steps (a) and (b) are conducted in aqueous solution at neutral or mild pH.

3. **(Original)** The method of claim 2, wherein the α-effect nucleophile is a peroxide.

4. **(Original)** The method of claim 3, wherein the peroxide is an inorganic peroxide of the formula M^+OOH^-, wherein M^+ is a counterion selected from the group consisting of H^+, Li^+, Na^+, K^+, Rb^+, and Cs^+.

5. **(Original)** The method of claim 3, wherein the peroxide is an organic peroxide of the formula ROOH, wherein R is hydrocarbyl optionally substituted with one or more nonhydrocarbyl substituents and optionally containing one or more nonhydrocarbyl linkages.

6. **(Original)** The method of claim 3, wherein the peroxide is activated by increasing the pH of the aqueous solution above the pKa of the peroxide such that the peroxide is converted to peroxy anion.

7. **(Original)** The method of claim 6, wherein the peroxy anion also removes exocyclic amine-protecting groups from the support-bound nucleoside monomer.

8. **(Original)** The method of claim 7, wherein the exocyclic amine-protecting groups that are removed from the support-bound nucleoside monomer are acetyl, trifluoroacetyl, difluoroacetyl, or trifluoroacetyl moieties.

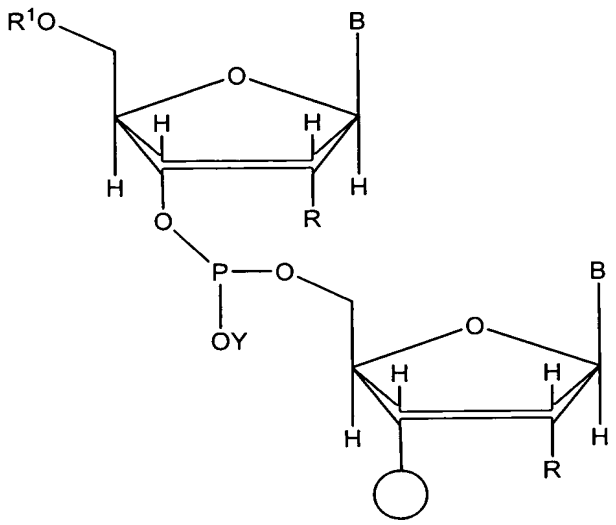
9. **(Original)** The method of claim 1, wherein the oligonucleotide synthesis is in the 3′ to 5′ direction.

10. **(Original)** The method of claim 9, wherein support-bound nucleoside monomer is bound to the support through its 3′-hydroxyl group.

11. **(Original)** The method of claim 10, wherein the coupled nucleoside monomer has a phosphorous derivative at the 3′ position and a carbonate protecting group at the 5′ position.

12. **(Original)** The method of claim 11, wherein the coupling reaction yields the structure of formula (IV)

(IV)



wherein ○ represents the solid support or a support-bound oligonucleotide;

R is hydrido or hydroxyl;

R^1 is a carbonate protecting group of the formula $COOR^3$ wherein R^3 is a substituted or unsubstituted hydrocarbyl;

B is independently selected from a purine base or a pyrimidine base; and

Y is hydrido or hydrocarbyl.

13. **(Original)** The method of claim 12, wherein when R is hydrido, the support-bound nucleoside is a deoxyribonucleoside and when R is hydroxyl, the support-bound nucleoside is a ribonucleoside.

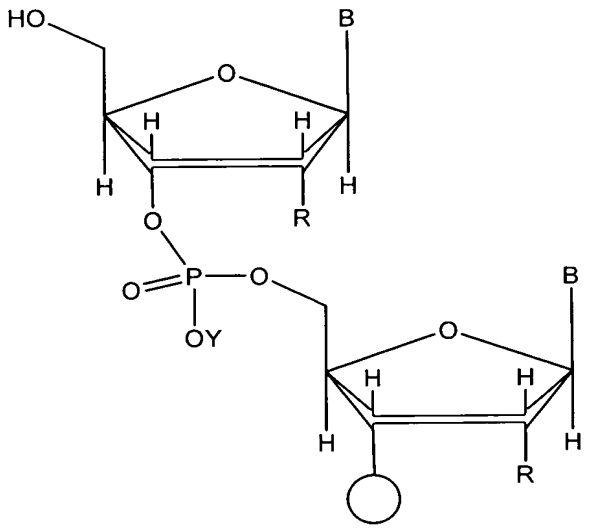
14. **(Original)** The method of claim 12, wherein R^1 is aryl carbonate selected from the group consisting of *o*-nitrophenylcarbonyl, *p*-phenylazophenycarbonyl, phenylcarbonyl, *p*-chlorophenylcarbonyl, 5'-(-methyl-2-nitropiperonyl)oxycarbonyl, and 9-fluoroenylmethylcarbonyl.

15. **(Original)** The method of claim 12, wherein the purine base or the pyrimidine base may be protected with a protecting group selected from the group consisting of acetyl, difluoroacetyl, trifluoroacetyl, isobutyrul, and benzoyl.

16. **(Original)** The method of claim 12, wherein when Y is hydrocarbyl, Y is selected from the group consisting of lower alkyl, electron-withdrawing substituted aliphatic, electron-withdrawing substituted phenyl, or electron-withdrawing substituted phenylethyl.

17. **(Original)** The method of claim 12, wherein the simultaneous deprotection and oxidation of the structure of formula (IV) with the α-effect nucleophile yields the structure of formula (VIII)

(VIII)



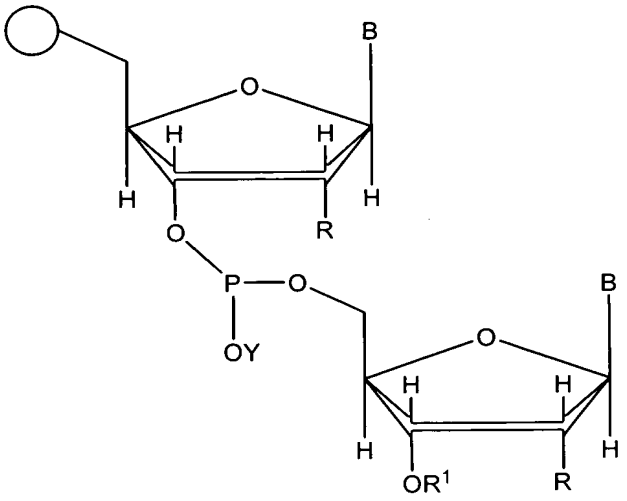
18. **(Original)** The method of claim 1, wherein the oligonucleotide synthesis is in the 5′ to 3′ direction.

19. **(Original)** The method of claim 18, wherein the support-bound nucleoside is bound to the support through its 5′-hydroxyl group.

20. **(Original)** The method of claim 19, wherein the coupled nucleoside monomer has a phosphorous derivative at the 5′ position and a carbonate protecting group at the 3′ position.

21. **(Original)** The method of claim 20, wherein the coupling reaction yields the structure of formula (XI)

(XI)



wherein ○ represents the solid support or a support-bound oligonucleotide;

R is hydrido or hydroxyl;

R^1 is a carbonate protecting group of the formula $COOR^3$ wherein R^3 is a substituted or unsubstituted hydrocarbyl;

B is independently selected from a purine base or a pyrimidine base; and

Y is hydrido or hydrocarbyl.

22. **(Original)** The method of claim 21, wherein when R is hydrido, the support-bound nucleoside is a deoxyribonucleoside and when R is hydroxyl, the support-bound nucleoside is a ribonucleoside.

23. **(Original)** The method of claim 21, wherein R^1 is aryl carbonate selected from the group consisting of *o*-nitrophenylcarbonyl, *p*-phenylazophenycarbonyl, phenylcarbonyl, *p*-chlorophenylcarbonyl, 5'-(-methyl-2-nitropiperonyl)oxycarbonyl, and 9-fluoroenylmethylcarbonyl.

24. **(Original)** The method of claim 21, wherein the purine base or the pyrimidine base may be protected with a protecting group selected from the group consisting of acetyl, difluoroacetyl, trifluoroacetyl, isobutyrul, and benzoyl.

25. **(Original)** The method of claim 21, wherein when Y is hydrocarbyl, Y is selected from the group consisting of lower alkyl, electron-withdrawing substituted aliphatic, electron-withdrawing substituted phenyl, or electron-withdrawing substituted phenylethyl.

26. **(Original)** The method of claim 21, wherein the simultaneous deprotection and oxidation of the structure of formula (XI) with the α-effect nucleophile results in cleavage of the carbonate linkage such that the moiety $-OR^1$ is converted to –OH and the phosphate triester linkage –O-P(OY)-O- is oxidized to a phosphotriester linkage.

27. **(Original)** The method of claim 12, wherein R^3 comprises a moiety that fluoresces or becomes colored upon cleavage of the carbonate protecting group.

28. **(Original)** The method of claim 21, wherein R^3 comprises a moiety that fluoresces or becomes colored upon cleavage of the carbonate protecting group.

29. **(Original)** The method of claim 1, wherein steps (a) and (b) are repeated until the oligonucleotide is of a desired length and sequence.

30. **(Original)** The method of claim 29, wherein upon completion of the oligonucleotide synthesis, the oligonucleotide is cleaved from the solid support.